

# FOCUS ON DIARRHOEA



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# INTRODUCTION

This hand-book is part of an information package on diarrhoea which also includes two tape-slide sets (or a video cassette) and an information chart. The package is aimed at professional health workers such as doctors and nurses who are responsible for the organization of health services in a community, district or region. It provides information to help health workers understand the problem of diarrhoea in their area and start planning control activities. It does not provide guidelines for the implementation of these activities, but suggests sources where this information can be obtained (see pages 30 and 31).

CH120

The information package on diarrhoea contains:

## Tape-slide sets

- Set one explains why diarrhoea is a major public health problem.
- Set two describes effective interventions for the control of diarrhoea.

A script with topics for discussion is also included.



Encouraging hand-washing early. (World Neighbors)

## Video cassette

The video incorporates the material from both tape-slide sets. It can be watched on any standard VHS video recorder.

## Hand-book

The hand-book reviews and develops the main themes from the tape-slide sets. Preferably you should watch the tape-slide sets and then use the hand-book to study specific sections and for reference purposes. The hand-book can, however, be used alone as described below.



Home-based oral rehydration therapy. (William Cutting)

## Information chart

The chart contains basic information on the clinical presentation, therapy, epidemiology and control of the most common agents of diarrhoea.

## HOW TO USE THE HAND-BOOK

The four sections of the hand-book look at:

1. The relationship between diarrhoea and poverty.
2. Why diarrhoea is a leading public health problem in most developing countries.
3. Interventions for the control of diarrhoea that are known to be effective and feasible.
4. How to set priorities in your area and start planning effective diarrhoea control measures.

If you are using the hand-book without the tape-slide sets, you can use it to help you plan a framework for a series of discussions with other health workers about the features of diarrhoea in your area and possible control measures. The case-studies described in the hand-book may present a different picture to your situation. Whenever possible, use local examples to illustrate the points made in the hand-book. Use the topics for discussion given at the back of the hand-book (pages 28 and 29) to guide the discussion.

One important point to bear in mind is that even though this information package focusses on diarrhoea, any discussions you have should always put the problem in the general context of primary health care.

### Approaches to training

In case you have not been involved in training before, we have listed some sources of information on training on the back page of this hand-book.



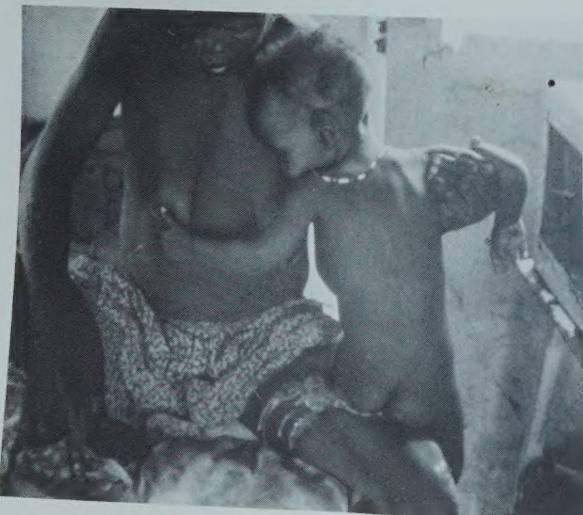
Sharing information is an important part of training. (Sunanda Ray)

# 1 A DISEASE OF POVERTY

## A DISEASE OF POVERTY

Diarrhoea is the passage of an increased number of abnormally loose or watery stools. It is such a common condition that everyone has had it, but few people realise that it is a leading cause of illness and death throughout the developing world.

Diarrhoea is a disease of poverty and is associated with the appalling environmental conditions that accompany poverty all over the world.



Acute watery diarrhoea. (Ian Cross)

## Water

60% of all persons in the developing world do not have adequate access to clean water supplies (Table 1). Women lose time and energy in the heavy task of collecting water for the needs of their family. They may have to walk long distances every day in the search for water, and the source that they use is often polluted.

## Sanitation

75% of all persons in the developing world live without any kind of sanitation facility (Table 2) and most people defaecate in the open wherever they can find some privacy.



Women may spend hours each day collecting water. (World Bank)

Table 1: *Population without adequate access to a clean water supply in the developing world.<sup>a</sup> (1980)*

	number (millions)	percentage
Urban	175	25
Rural	1148	71
Total	1323	57

<sup>a</sup> Excluding the Peoples' Republic of China.

Table 2: *Population without adequate sanitation in the developing world.<sup>a</sup> (1980)*

	number (millions)	percentage
Urban	330	47
Rural	1425	87
Total	1755	75

<sup>a</sup> Excluding the Peoples' Republic of China.

Source: *Drinking Water and Sanitation, 1981-1990. A Way to Health*. Available from WHO (see resource centres).



Animals leave their faeces all over the place. (Jeremy Hartley)

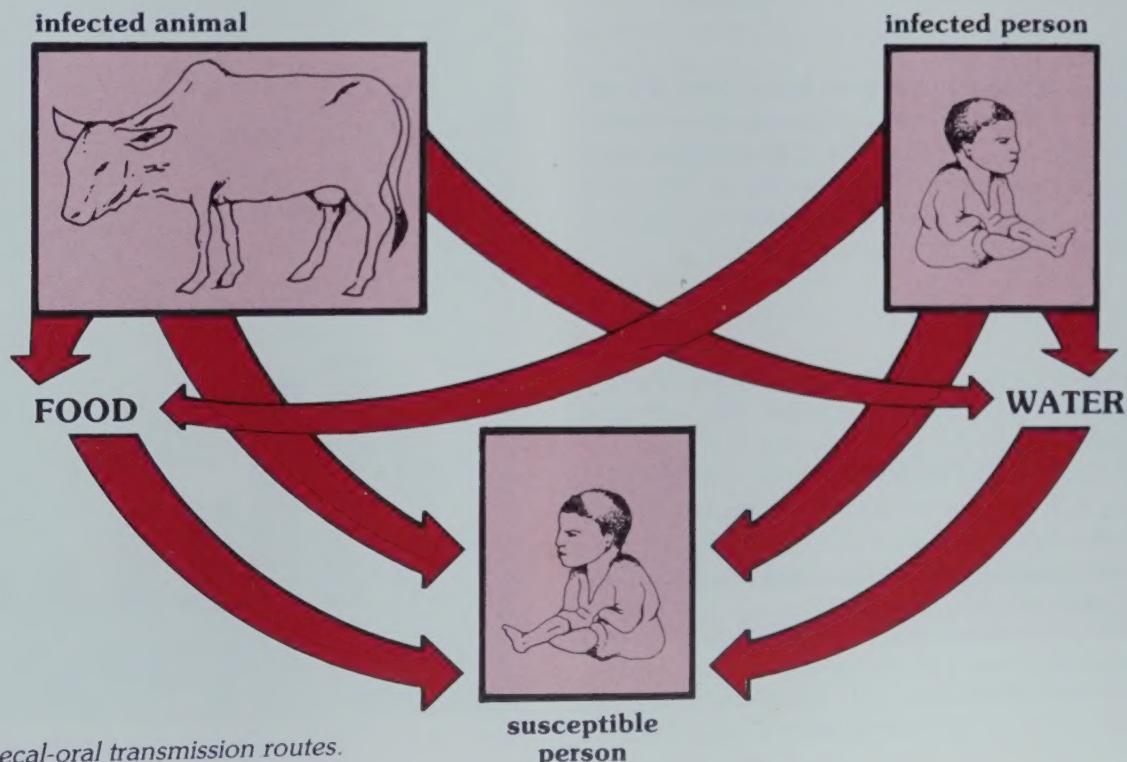


Figure 1: Faecal-oral transmission routes.

## Crowding and pollution

These appalling environmental conditions facilitate the spread of infectious agents that cause diarrhoea. These agents are transmitted by the faecal-oral route, that is, they leave an infected person or animal in the faeces and enter another person through the mouth (Figure 1). Transmission is intensified in the inadequate and crowded conditions in which poor people live.



Even in the midst of plenty there are pockets of deprivation and pollution. The poorest of the poor, such as slum dwellers and landless peasants, are most at risk of illness and death from diarrhoea. (Jeremy Hartley)

## A WAY TO CONTROL?

In wealthy communities throughout the world diarrhoea has become a minor health problem. The fundamental question in diarrhoea control is this: how may the disease pattern of a poor community be changed to the pattern of a wealthy community? If the only way to change this pattern is by eliminating poverty and drastically improving incomes and educational levels, then we should focus on the long-term process of economic development and political change. But we need not wait that long: there is evidence that illness and death due to diarrhoea can be reduced in poor communities by selected interventions which can be implemented now, at a cost that governments can afford.

## 2 MAGNITUDE OF THE PROBLEM

### METHODS OF INVESTIGATION

Accurate information about diarrhoea in developing countries is scarce. Routine health statistics are unhelpful here, since most episodes of diarrhoea do not come to the attention of health workers, and when they do, they are not always recorded.

To obtain the most valid data, active surveillance is needed. Active surveillance means that the illnesses and deaths are actually searched for in the community. Regular visits are made to households to ask about disease and the same community is followed over a long period of time, at least one year because of seasonal variation in diarrhoea. Active surveillance, however, is arduous and expensive, and only a few detailed community-based studies of diarrhoea have been conducted, essentially for research purposes.



active surveillance. (UNICEF)

In order to assess the global problem of diarrhoea, the World Health Organization has recently reviewed active surveillance data from various parts of the world<sup>1</sup>. Data from studies conducted in Africa, Asia and Latin America were combined to give estimates of diarrhoeal morbidity and mortality rates.

### MORBIDITY

The estimated median diarrhoeal morbidity rate is 2 episodes per child per year in children under 5 years of age.

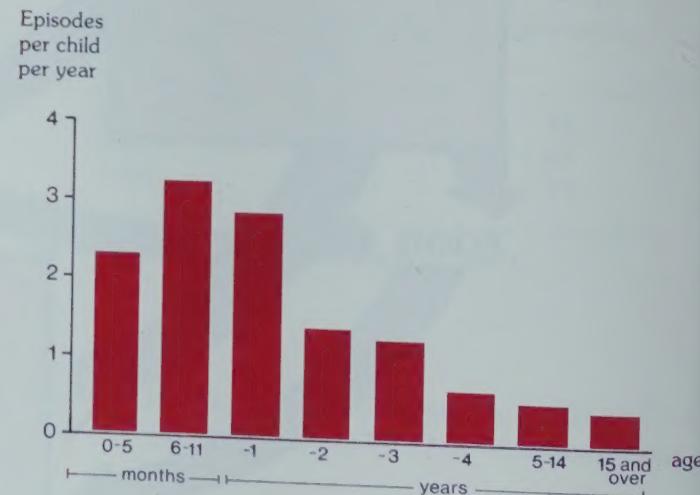
A similar age distribution has been found everywhere. Figure 2 shows the estimated median diarrhoeal morbidity rates, by age group. The highest rates were found in children aged 6 months to 11 months. For persons over 5 years of age, most studies reported less than one episode per person per year.

The estimated median diarrhoeal morbidity rate of 2 episodes per child per year is a *conservative estimate*. Higher rates were found in studies with frequent surveillance where household visits were made at least once a week. It is a *global estimate*; in deprived families morbidity rates are likely to be higher. It is an estimate for the *first 5 years of life*: rates are highest in children under 2 years of age.

The estimated diarrhoeal morbidity rate of 2 episodes per child per year is only a median figure. Some children will have more diarrhoea, some less.

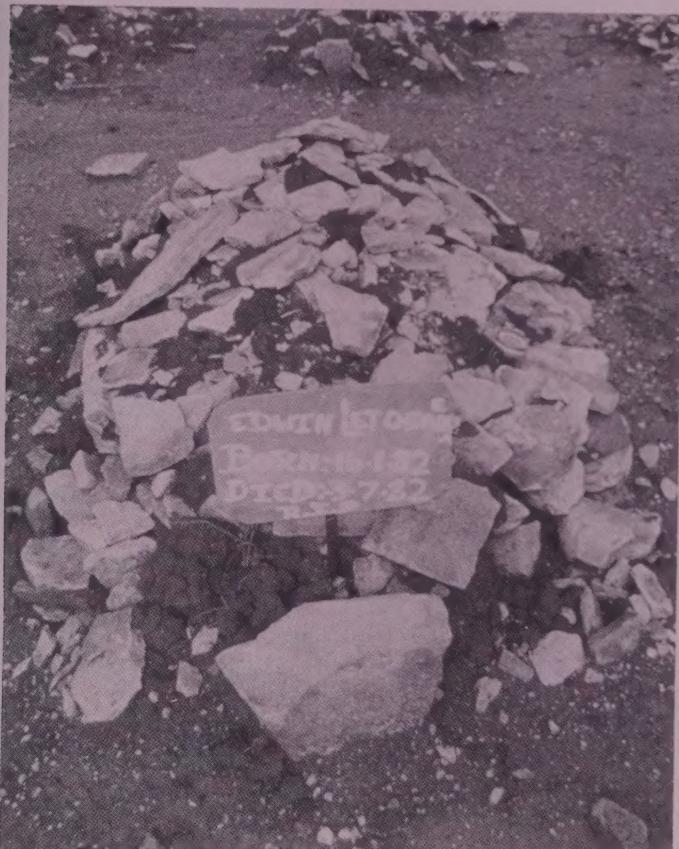
In a study carried out in a crowded area of Djakarta, in Indonesia<sup>2</sup>, a group of 66 children were observed from birth till the age of 2. Weekly visits were made to their homes to ask about diarrhoea. A total of 409 episodes were recorded, a mean of 6 per child. Only 2 children were free from diarrhoea, 36 had 4 to 9 episodes each, and one child had 20 episodes.

Figure 2: Age-specific diarrhoeal morbidity rates.



## MORTALITY

Studies involving active surveillance of deaths have found a median annual diarrhoea-associated mortality rate of 14 deaths per 1,000 children per year in children under 5 years of age. Figure 3 shows the estimated median diarrhoea-associated mortality rates, by age group. In all studies, the highest mortality rates were in children in the first two years of life. The mortality rate was much lower in children aged 2 to 5 years.



Most deaths due to diarrhoea occur in very young children. (OXFAM)

Figure 3: Age-specific diarrhoeal mortality rates.

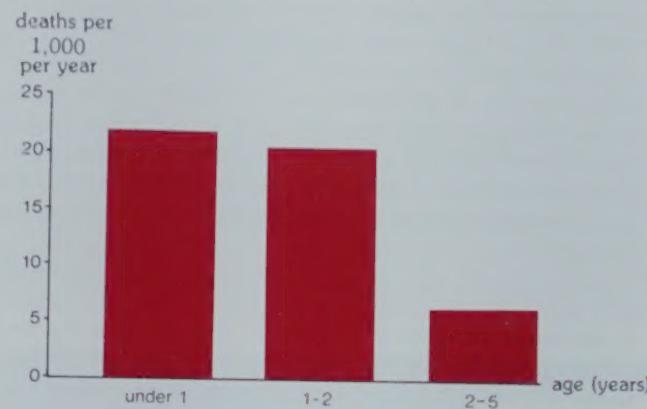


Table 3: Distribution of 100 diarrhoea deaths among children under 5 years of age.

Age (months)	number of deaths
0 - 5	29
6 - 11	16
12 - 23	35
24 - 59	20

## Case-fatality ratio

To assess the relationship between morbidity and mortality rates, the case-fatality ratio can be calculated from the number of episodes and deaths estimated from active surveillance data. There are about 6 deaths for every 1,000 episodes of diarrhoea. The case-fatality ratio is highest in children under 2 years of age.

## GLOBAL MORBIDITY AND MORTALITY

The total annual number of episodes of diarrhoea in children under 5 years of age can be estimated from the median diarrhoeal morbidity rate and population figures for this age-group. If the under-5 population in Africa, Asia (excluding China) and Latin America is 400 million and the diarrhoeal morbidity rate is 2 episodes per child per year, the total annual number of episodes in these countries is 800 million every year.

The total annual number of deaths associated with diarrhoea in children under 5 years of age can be estimated in the same way using the median diarrhoeal mortality rate of 14 deaths per 1,000 children per year. A total of 5.6 million deaths is reached, that is one death every 6 seconds.

You can do similar calculations for your country or your area if you have population figures for children under 5 years of age.



Severely dehydrated child. (Ian Cross)

## MALNUTRITION

Diarrhoea is also a major contributor to malnutrition in many ways:

- food intake may decrease because of the apathy, nausea, vomiting and abdominal pain which frequently accompany diarrhoea. In some cultures, no food is given to the sick child.
- as a direct result of the diarrhoea there may be decreased absorption of nutrients.
- the stress and fever caused by the disease will to some degree increase food requirements.



(Isabelle de Zoysa)

Some studies have documented the association between diarrhoea and subsequent growth. A study in Guatemala<sup>3</sup> showed that children who spent less time with diarrhoea had considerably larger increases in weight and height than children who were ill with diarrhoea for longer periods. In contrast, fever and respiratory diseases did not affect growth rates. These findings were valid for a large group of children and also for individuals: the same child appears to grow less well when he has diarrhoea than when he has not.

A similar study from the Gambia<sup>4</sup> showed that the only diseases which contributed to growth faltering were diarrhoea and malaria. But malaria was far less common than diarrhoea and its quantitative effect on growth was not as great.

Weight-loss can be dramatic in a child with diarrhoea. Figure 4 shows the growth chart of a child observed from birth to the age of 3 in a prospective study in Guatemala<sup>5</sup>. The coloured line indicates changes in the weight of the child, and each arrow marks the onset of an episode of diarrhoea. This child had a total of 13 episodes of diarrhoea in the first 3 years of life. Weight loss frequently occurred during and after each episode of diarrhoea, and the child suffered long periods of weight faltering.



Children with diarrhoea frequently lose their appetite and even mothers who want to feed their ill child may find this difficult and time-consuming. (David Nabarro)

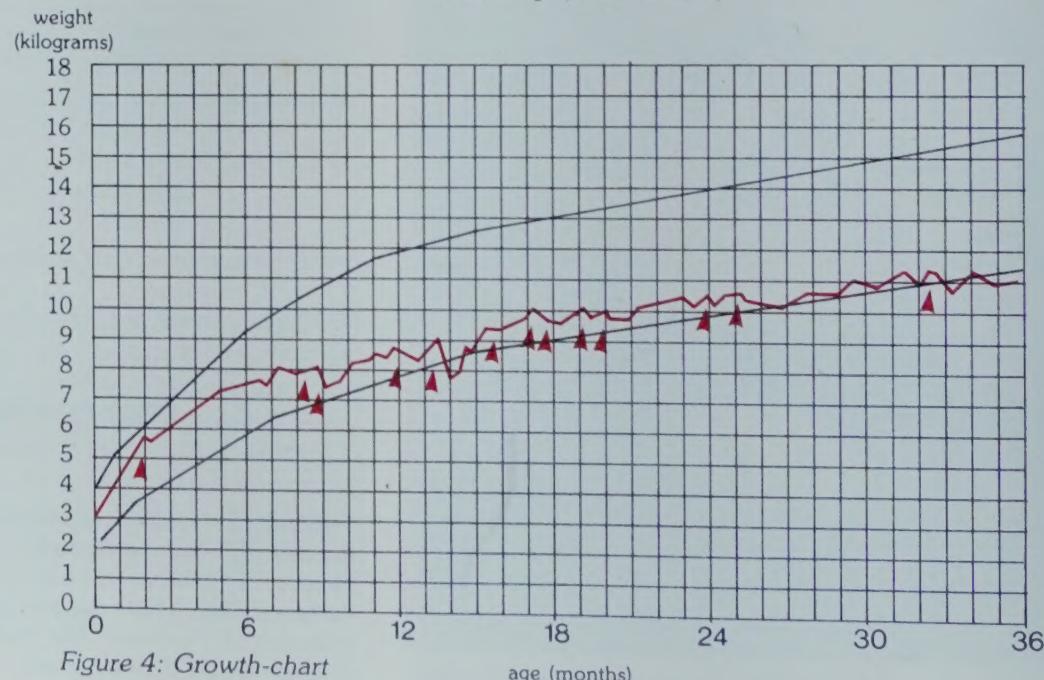


Figure 4: Growth-chart

On the other hand, it is not clear to what degree poor nutritional status predisposes to diarrhoea. A few studies have found that diarrhoea incidence rates are higher in malnourished than in well-nourished children, and that these rates increase progressively with the degree of malnutrition. Other studies, however, have failed to show this relationship between poor nutritional status and risk of diarrhoea. Unfortunately, the interpretation of a number of these studies is difficult because they failed to control for confounding factors such as socio-economic status. It may be that malnutrition and diarrhoea only reflect the underlying condition: poverty. After all, it is the children from the most deprived families who are likely to be growing poorly because of an insufficient and unbalanced diet. Their mothers will usually be busy earning cash or working in the fields and will have little time available for food preparation and child care.



In most countries women play an essential role in food production. (UNICEF)

These children will also be at risk because they live in a crowded and polluted environment, with inadequate access to water and sanitation.

There is, however, good evidence that in malnourished children diarrhoea is more *severe* and more *prolonged*. Because of the increased severity and longer duration of the disease in malnourished children, they are more likely to die of diarrhoea.

A study in Bangladesh<sup>6</sup> looked at the relationship between nutritional status in a group of 2,000 children aged 1 to 2 years and risk of death over the following 2 years. Diarrhoeal death rates were almost 4 times higher among the severely malnourished children than among children of better nutritional status.



## COMPARISON WITH OTHER DISEASES

The global figures for illnesses and deaths associated with diarrhoea are staggering, but it is not clear from data presented so far how these figures relate to total childhood morbidity and mortality. Disease patterns differ considerably from area to area. In developing countries, wherever the disease pattern has been carefully documented, as in the studies reported here, diarrhoea has emerged as a leading cause of childhood morbidity and mortality.



(OXFAM)

In one study of a village population in Guatemala<sup>5</sup>, 45 children were observed from birth till the age of 3. Their homes were visited weekly to collect information on illness. Table 4 shows incidence rates of 4 main groups of illnesses during the first 3 years of life. Diarrhoea was the most frequently occurring illness reaching a maximum rate of 10 episodes per child per year during the second year of life. Other illnesses observed in these children, in decreasing order of frequency, were: upper respiratory tract infections, lower respiratory tract infections and common communicable diseases such as measles and whooping cough.

Table 4: *Morbidity, Guatemala.*

	Episodes per child per year.		
	1st year of life	2nd year of life	3rd year of life
diarrhoea	6	10	8
upper respiratory tract infections	4	4	4
lower respiratory tract infections	2	3	2
common communicable diseases	1	1	1

A report was published by the Pan American Health Organization (PAHO) in 1973<sup>6</sup>, describing patterns of childhood mortality in Latin America. Diarrhoea was associated with 29% of 35,000 deaths in children under 5 years of age. It was by far the most common single cause of death in the study areas.

In the same part of Guatemala, surveillance of deaths was conducted in a larger population in 3 villages over a 10-year period<sup>7</sup>. Table 5 shows diarrhoeal mortality rates and the proportion of all deaths associated with diarrhoea, by age group. In this study, diarrhoeal mortality rates were highest in children aged 1 to 2 years and were still high in children aged 2 to 3 years. There was a sharp drop in mortality rates thereafter.

In infancy, despite a high diarrhoeal mortality rate, deaths from acute diarrhoea accounted for only 14% of all deaths. This is an age-group which has a high overall mortality rate and other causes of death such as neonatal tetanus and lower respiratory tract infections were also common.

For children aged 1 to 2 years, the proportion of all deaths associated with diarrhoea was 41% and remained high until adulthood. Although mortality rates for diarrhoea were highest in children aged 1 to 2 years and decreased progressively in later years, the proportion of all deaths associated with diarrhoea remained the same. In fact, in children aged 5 to 14 years, when the age-specific diarrhoeal mortality rates were only 3 per 1,000 per year, the proportion of all deaths associated with diarrhoea was exactly the same (41%) as in children aged 1 to 2 years when rates for diarrhoea were at a maximum. *Diarrhoea remained a leading cause of death well into adulthood.*

Table 5: *Mortality, Guatemala.*

Age (years)	Diarrhoeal deaths per 1,000 per year	Diarrhoeal deaths as a percentage of all deaths
under 1	17	14
1 -	36	41
2 -	28	53
3 -	12	43
4 -	10	55
5 - 14	3	41
15 and over	2	16

## PRESSURE ON THE HEALTH SERVICES

But that is not all: in many areas of the world diarrhoea cases account for 30% or more of admissions to children's hospitals or wards where they receive expensive intravenous fluids, and unnecessary antibiotics and drugs, thereby putting a heavy burden on national health budgets.



Health worker visiting mother at home in Bangladesh. (David Nabarro)

In a study conducted in Bangladesh<sup>9</sup>, 200 village children aged 2 months to 5 years were observed for a period of one year. A field worker visited each child every other day to ask about illness. Simple treatment for illness was provided if needed, such as oral rehydration therapy for diarrhoea. At least one illness was recorded on 75% of all days of observation. Upper respiratory tract diseases (purulent nasal discharge, cough or pharyngitis) were present on 60% of all days (Table 6). Diarrhoea was the second most common illness and was found on 13% of all days. Next came impetigo, scabies and other skin infections.

Table 6: *Disease prevalence, Bangladesh*

upper respiratory diseases	60%
diarrhoea	13%
impetigo	8%
scabies	7%
other skin infections	5%

Diarrhoea, however, placed the heaviest demands on the health services. 52% of all admissions to the health centre were due to diarrhoea. Next came pneumonia with 18% of all admissions.



A typical scene in many health facilities. (OXFAM)

# SEASONALITY

## SEASONAL DIMENSIONS TO DIARRHOEA

Reported diarrhoeas usually show a marked seasonal variation and the pressure on the health services is not constant throughout the year. The seasonality of reported diarrhoeas in general reflects the seasonality of all diarrhoeas in the community and should be carefully recorded. Hospital or health centre data may be used in this way to determine the seasonal patterns. This is important in order to predict the times of increased stress and to plan control measures. For example, extra supplies of oral rehydration salts may be required during certain months of the year and orders must be placed well in advance.



Busy health centre. (Mujibur Rahaman)

Very often in tropical countries with marked wet and dry seasons, there is an increase in diarrhoea at the time of the rains. There is, however, no clear and direct relationship between diarrhoea and rainfall. In some areas, the diarrhoea peaks before the rains, in others, much later.

More often, diarrhoea follows changes in temperature, with a peak due to an increase in bacterial diarrhoeas in the hottest season (whether hot-wet or hot-dry), and a peak due to an increase in viral diarrhoeas in the coldest season (whether cold-wet or cold-dry). This seasonal pattern is most apparent in temperate climates where there are large variations in temperature, but it is by no means found everywhere: in some areas there is only one peak and in others the peaks are blunted.

Also, there are many seasonal factors in poor rural societies that are not as obvious as climatic factors. In most areas, the rainy season coincides with a peak in agricultural activity to prepare the land for planting. It is usually the most critical time of the year when many adverse factors overlap and interact: food is short, food prices are high and there is a lot to be done in the fields. Women are overburdened with work and have less time available for food preparation and child care. Disease is common at these times, especially malaria and diarrhoea, but there is no time to look after ill children. Time away from the fields now might mean more hunger next year. This is a time of year marked by weight loss, disease, high mortality and increased poverty.



Very often there is only time to cook once a day and food is left for children to help themselves. (OXFAM)

The graph in Figure 5 shows admissions for acute diarrhoea in 1975 in a hospital which serves a large rural area of Bangladesh<sup>10</sup>. The number of admissions varied considerably from month to month. The maximum in any month was over 300, the minimum around 50.



There are times when poor people are at their poorest. There are hungry seasons and there are sick seasons. (Earthscan)

The graph in Figure 6 shows monthly reportings for diarrhoea at a rural hospital in Lesotho in Southern Africa over a period of 5 years<sup>11</sup>. Both out-patients and in-patients are included. The peak came at about the same time every year, but varied in amplitude from year to year. Monthly cycles, therefore, are compounded by yearly cycles to the extent that no single year is representative.

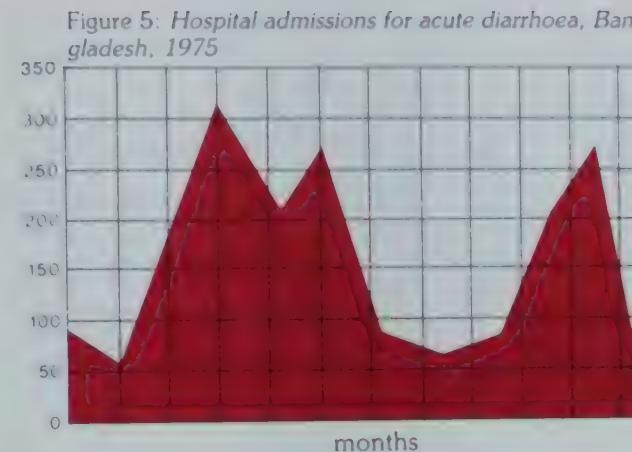
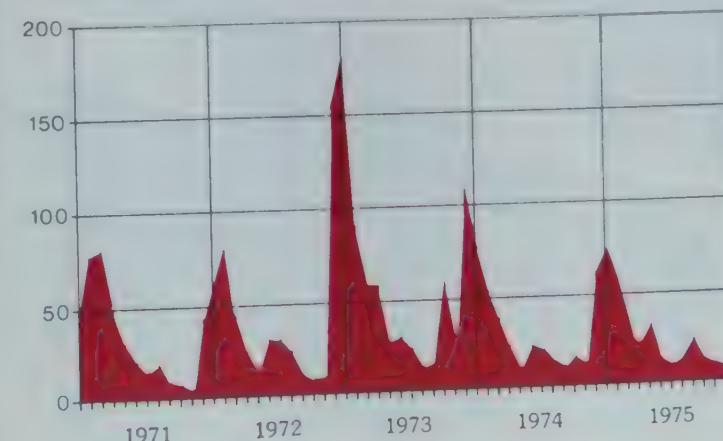


Figure 6: Monthly reportings for diarrhoea, Lesotho, 1971-75



## CONCLUSIONS

### Diarrhoea:

- causes high childhood MORBIDITY
- causes high childhood MORTALITY
- is a major contributor to MALNUTRITION
- puts heavy DEMANDS ON THE HEALTH SERVICES

Las causas de la **DIARREA**  
¿cómo podemos prevenirla?



Jornadas Populares de Salud  
Nicaraguan leaflet about preventing diarrhoea.

### 3 CONTROL

#### CONTROL

**There are three basic approaches to the control of diarrhoea:**

- **case management, to prevent deaths due to dehydration and reduce diarrhoea-associated malnutrition.**
- **interrupting the transmission of the infectious agents that cause diarrhoea.**
- **increasing the resistance of children to diarrhoeal illness and death.**



**Medicines usually do more harm than good**

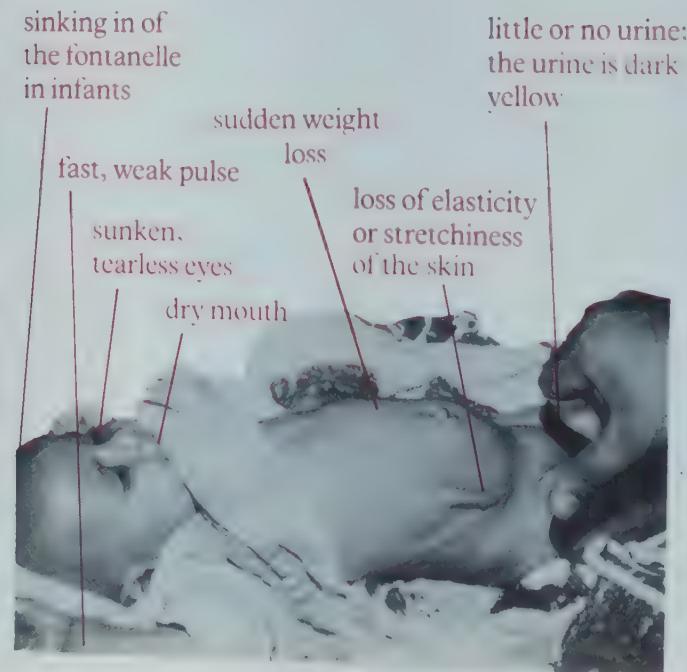
Medicines should not be given in the treatment of diarrhoea, except in severe cases of dysentery or cholera, or in cases of amoebiasis or giardiasis (see chart-'Coping with diarrhoea').

#### CASE MANAGEMENT

##### Rehydration

Adequate, early rehydration, particularly oral rehydration, is the most important feature of the management of acute diarrhoea, whatever the cause. Most deaths due to acute diarrhoea are caused by dehydration. A child with acute diarrhoea begins to lose essential water and salts from the onset of the illness. Unless these are adequately replaced, dehydration will develop.

**Figure 7: The signs of dehydration.**



**Prevention of dehydration** is therefore the first appropriate response to diarrhoea. Extra drinks should be given such as water, fruit juices, rice-water, soups or other home-drinks. Sugar-salt solutions may be prepared if the ingredients are available.



**Make sure children with diarrhoea drink plenty of fluids. (UNICEF)**

*Recipe for sugar-salt solution.*

8 level 5 ml teaspoons of sugar  
1 level 5 ml teaspoons of salt

In 1 litre of water

*Recipe for glucose-electrolyte solution*

3.5 g of sodium chloride  
2.9 g of bisodium citrate dihydrate  
(or 2.5 g of sodium bicarbonate)  
1.5 g of potassium chloride  
20g of glucose

In 1 litre of water

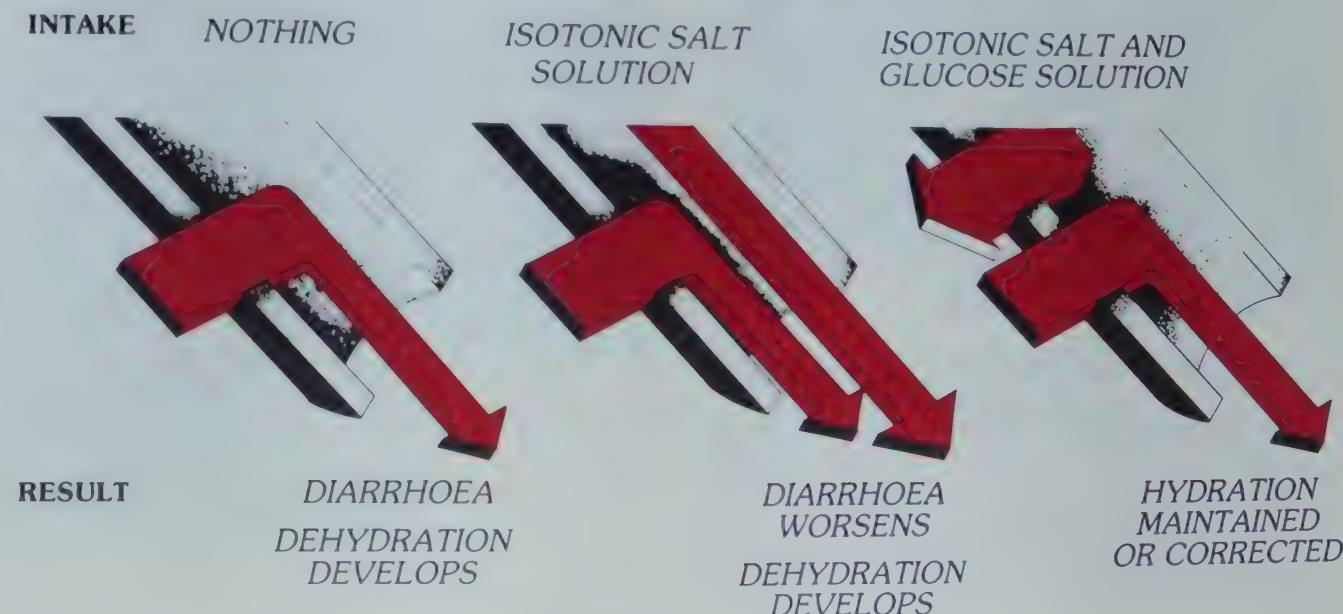
*'The discovery that sodium transport and glucose transport are coupled in the small intestine, so that glucose accelerates absorption of solute and water, was potentially the most important medical advance this century.'*<sup>13</sup>

For the **treatment of dehydration**, oral rehydration salts, which contain glucose, sodium, bicarbonate and potassium, should be used if available. If not, carefully prepared rice-powder electrolyte<sup>13</sup> solutions or sugar-salt solutions are also effective. Intravenous rehydration therapy may be indicated in cases of severe dehydration or in patients who are unable to drink because of altered consciousness or persistent vomiting.

Oral rehydration therapy is simple, effective and inexpensive, and ensuring that it is widely available and used is a major public health challenge.

Oral rehydration therapy is based on the observation that certain substances like glucose and some amino-acids are actively transported across the intestinal wall, carrying with them sodium and water. Diarrhoea interferes with sodium transport but glucose transport remains largely intact. Studies have shown that glucose enhances the absorption of sodium and water so that the net absorption from glucose-electrolyte solutions can compensate stool losses even when these losses are rapid, as in cholera (Figure 8).

Figure 8: *The effect of glucose on intestinal absorption of salt water during acute watery diarrhoea.*



## Community responsibility

Access to health services in most areas is poor and usage rates are low. Most episodes of diarrhoea quickly blow over without treatment and it is little wonder that they do not come to the attention of health workers. The more remote the village or the family, the less likely it is that people will come for help, unless they are severely ill.



(Intervista Advertising Ltd.)

It is therefore not enough to provide oral rehydration therapy through the health services alone. Responsibility must be handed over to families and mothers should be taught to recognize childhood diarrhoea as an illness that requires early treatment, and shown how to prepare and administer home-drinks for diarrhoea. They must also know when a child needs extra care from a health worker.

In a study conducted in a rural area of Bangladesh<sup>14</sup>, weekly visits were made to households located within 6 miles of a diarrhoea clinic to ask about diarrhoea, and attendance rates at the clinic were carefully monitored. Within the first mile from the clinic, 90% of all persons who had diarrhoea came to the clinic for treatment. At 2 miles, the attendance rate fell to 60%. The greater the distance to the clinic, the more severe was the degree of dehydration on presentation, requiring more frequent use of intravenous rehydration therapy. The impact of the clinic services on mortality due to diarrhoea was significant *only within the first 2 miles from the clinic*.

At the same time that community responsibility is emphasized, the health services must be strengthened so that they can provide adequate supervision and referral services. In health facilities, supplies and equipment should be ready and staff prepared so that a dehydrated child may be appropriately treated.

If oral rehydration therapy is extended right into the community, a considerable impact on mortality due to acute diarrhoea among young children may be expected. In fact, in a number of research studies, the provision of oral rehydration therapy at community level has halved the number of deaths due to acute diarrhoea over a one-year period.



Mothers learning how to use home-ingredients to prepare oral rehydration solutions in Bangladesh.  
(David Nabarro)

A study was conducted in 11 villages in Egypt<sup>15</sup> to assess the impact of home-based oral rehydration therapy on child mortality. In some of the villages, health workers visited households to provide ingredients for the preparation of oral rehydration solution and give instructions in its use. Results showed that diarrhoeal death rates were halved in the villages where oral rehydration therapy was available in the home compared to the control villages.



(Mujibur Rahaman)

Children can also learn how to treat diarrhoea.

### Appropriate feeding

The proper management of diarrhoea also includes appropriate feeding during and after the episode in order to prevent or correct the weight loss which often accompanies diarrhoea. Mothers must be encouraged to continue feeding, especially breast-feeding, throughout the episode of diarrhoea. If food intake is interrupted because of illness or persistent vomiting, early feeding with nutritious foods must be encouraged. After the diarrhoea stops, more foods than usual should be given to help the child regain his strength.



Correct feeding is as important as rehydration for children with diarrhoea. (OXFAM)

Studies have shown that the provision by community-based workers of oral rehydration therapy together with the promotion of appropriate feeding during and after diarrhoea is associated with better weight gain in young children.

A study was conducted in two communities in the Philippines<sup>16</sup> to assess the nutritional benefits of an oral rehydration therapy programme. In both communities, young children reporting to the health centre with diarrhoea were examined by the medical staff and given non-specific anti-diarrhoeal medicines and antibiotics according to local practice. Oral rehydration solution was provided in only one of the two communities. Mothers in both communities received education on nutrition including advice on feeding during diarrhoea. All children were examined at home daily throughout their illness and the educational messages were repeated. Children who received oral rehydration therapy gained more weight during an episode of diarrhoea and over a period of several months than did control children.

However, case management does not prevent illness and will have little impact on mortality due to chronic diarrhoea and dysentery, and so other control measures are also needed.

## INTERRUPTING TRANSMISSION

### Improved water supply

A clean and plentiful water supply can interrupt the transmission of diarrhoea in a number of ways. Many people drink heavily contaminated water from open wells, ponds or streams. Replacing these sources by protected wells or piped water will dramatically improve water quality and prevent waterborne transmissions of diarrhoea.



(UNICEF)

### Improved personal and domestic cleanliness

However, infectious agents that cause diarrhoea may also be transmitted on hands, food or objects, especially where water is insufficient to permit adequate personal and domestic cleanliness. But frequent washing is difficult when the nearest water source is far from the home and water for domestic use must be laboriously carried in small containers. Improved cleanliness depends on an abundant and reliable supply of water located near the home. Improved cleanliness also depends on the correct use of water once it is available: frequent hand-washing<sup>17</sup> may be especially effective in controlling diarrhoea.

In a study in Bangladesh<sup>18</sup>, family contacts of patients with *Shigella* dysentery were followed over a period of 10 days. Half the families received several pieces of soap and earthenware pitchers, and were advised to wash their hands with soap and water after defaecating and before handling food. In the families who received soap, water and hygiene education the case rate of dysentery among the contacts of the initial case was 2%, as compared to 14% in the control group. This simple intervention therefore achieved a 7-fold reduction in the secondary case rate of shigellosis among family contacts.



It is difficult for mothers to think about hygiene in situations like this - but health education can help. (UNICEF)



Hand-washing prevents diarrhoea. (OXFAM)

## Improved sanitation

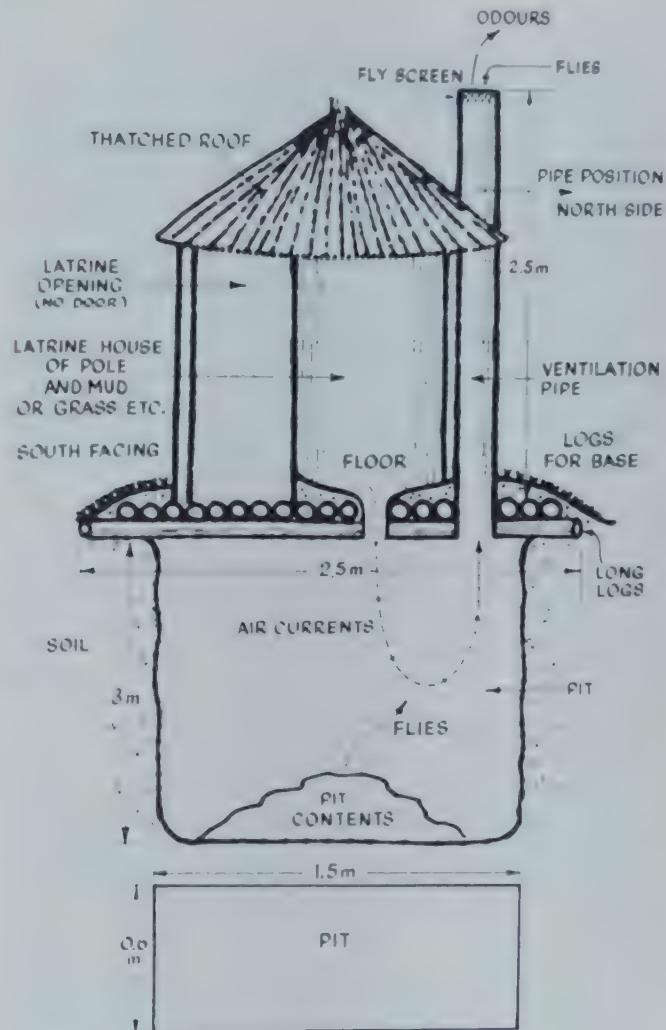
Sanitation, or the safe disposal of faeces, is important to reduce the faecal pollution of the environment. Each family should have access to a latrine which all members use and keep clean. The latrine must be acceptable and attractive to the users, especially the children.



A clean latrine that everyone will use. (Duncan Mara)

Figure 9: Diagram of the ventilated improved pit latrine, designed in Zimbabwe

## Focus on children



Children are not only the main sufferers from diarrhoea, they are also the main source of infection. Parents often believe that the faeces of young children are harmless. This is not the case: *they are very dangerous*. The defaecation and hygienic behaviour of young children is a vital but often neglected component of diarrhoea control programmes.



Young children often defaecate very close to the home, in the yard where they play. (Helen Pickering)

## INCREASING RESISTANCE OF CHILDREN TO DIARRHOEAL ILLNESS OR DEATH

A number of risk factors are associated with increased diarrhoeal morbidity and mortality. In particular, poor infant feeding practices and measles. The prevalence of these risk factors can be reduced by the promotion of breast-feeding and measles immunization.



Risks associated with bottle-feeding: malnutrition and diarrhoea. (TALC)

## Promotion of breast-feeding

In many developing countries, an increasing number of mothers are not breast-feeding their baby. Some infants are never put to the breast at all, others are but not for long enough. Yet there is evidence<sup>19</sup> that breast-fed infants have lower diarrhoeal morbidity and mortality rates than other, otherwise similar, infants. Infants who receive no breast-milk have a higher risk of getting diarrhoea than infants who are partially breast-fed, and those who are partially breast-fed have a higher risk than those who are exclusively breast-fed. These relative risks may be especially high in the first few months of life.

Breast-feeding also protects against death from diarrhoea. During the first 6 months of life, infants who receive no breast-milk are about 25 times more likely to die of diarrhoea than children who are exclusively breast-fed<sup>19</sup>. Even partial breast-feeding confers some protection compared to no breast-feeding at all.

This is true in wealthy and poor families alike, though of course diarrhoeal morbidity and mortality rates among children from wealthy families are much lower. The promotion of breast-feeding is clearly an important intervention to reduce diarrhoea morbidity and especially mortality in the first year of life.

Mothers should therefore always be encouraged to breast-feed their children. Exclusive breast-feeding should be promoted during the first 4 to 6 months of life, then partial breast-feeding should be continued along with appropriate weaning foods for as long as is possible.



(Ian Cross)

### How breast-feeding may protect against diarrhoea:

- through the anti-infective properties of the breast-milk.
- exclusively breast-fed infants have an intestinal flora that may inhibit the growth of diarrhoea-causing organisms.
- infants receiving bottle milk feeds are at risk from contamination of the milk, the bottle, or the teat, and infants receiving solid foods are at risk from the contamination of the foods.
- breast-fed infants may have a better nutritional status than other infants and may therefore have a reduced risk of death from diarrhoea.

## Measles immunization

There is a marked association between measles and diarrhoea in developing countries: diarrhoea often seems to occur in close association with an attack of measles and children are more susceptible to diarrhoea for up to 6 months after the onset of measles. Up to 7% of diarrhoea episodes in children under 5 years of age may be measles-associated, that is occurring between one week before the onset of the rash to 6 months after the onset of the rash.

Measles-associated diarrhoea appears to take on severe forms and leads more often to death than other diarrhoeas. A considerable proportion of diarrhoeal deaths among young children may therefore be measles-associated.

It has been estimated<sup>20</sup> that up to a quarter of diarrhoeal deaths among children under 5 years of age could be prevented by an effective measles immunization campaign. A vaccine against measles has been available for some time and is being promoted in an increasing number of developing countries within their Expanded Programme on Immunization (EPI). Measles immunization, therefore, is of benefit to child health not only because it prevents deaths due to measles, but also because it is a useful intervention to reduce deaths due to diarrhoea.



An immunization programme in India. (UNICEF)

## CONCLUSIONS

### Effective and feasible interventions to control diarrhoea:

- case management
- improved water supply and sanitation
- improved personal and domestic cleanliness
- promotion of breast-feeding
- measles immunization



In a study in Bangladesh<sup>21</sup>, 6,000 village children were observed over a period of one year, and the occurrence of measles and diarrhoea and the causes of all deaths were recorded. Children with measles had a higher incidence of diarrhoea than other children. Diarrhoea was the most common complication in fatal cases of measles, and the risk of death following measles with diarrhoea was considerably higher than the risk of death following measles alone or diarrhoea alone. One third of all deaths due to diarrhoea among these children were measles-associated. It was also noted that younger children (less than 4 years of age) who had measles with diarrhoea had more severe and more persistent weight loss than children with measles alone.

## 4 THE WAY FORWARD

### THE WAY FORWARD

There is new hope that diarrhoea can be brought under control in the developing world, and a concerted effort is needed to make sure that this hope is fulfilled. The planning, implementation and evaluation of diarrhoea control activities will require many efforts on the part of health workers. The goal is to design an effective, feasible and affordable programme which will reduce diarrhoea morbidity and mortality even before there has been any dramatic socio-economic change.



Health messages should also be aimed at children. (Earthscan)

### An integrated approach

Diarrhoea control activities must be integrated with other essential primary health care programmes such as mother and child health care (MCH), the Expanded Programme on Immunization (EPI) and water and sanitation programmes. An integrated approach within the context of primary health care will make sure that these programmes are carried out in a manner that will achieve maximum impact on child health.

For example, for most impact on diarrhoeal mortality, measles immunization should attain high coverage of malnourished children and children of deprived families. Water supplies and sanitation should go hand in hand whenever possible and the quantity and availability of water should be emphasized at least as much as water quality. They should always be supported by educational programmes which focus on the defaecation and hygiene practices of young children.

*'The fact that a major improvement in the health and well-being of the world's children **can** now happen does not automatically mean it **will** happen. And the challenge ahead is the challenge of translating the local successes which show that a child health revolution is a **possibility** into intensive national campaigns which **will** make that revolution into a **reality'.***

Source: *The State of the World's Children, 1984.*  
Available from UNICEF (see resource centres).

### WHAT CAN YOU DO IN YOUR AREA?

Here are a few suggestions for ways to develop diarrhoea control activities in your area.

#### 1. Find out about national policies and programmes for the control of diarrhoea

Examine the priority health policies of the Government and find out what primary health care programmes are being proposed at national level. If there is an operational diarrhoea control programme, find out what its objectives are and what priority interventions are being promoted to reach these objectives. There may be plans to develop diarrhoea control activities in your area.

#### 2. Describe the problem

There is no single pattern of disease which is valid for all developing countries or even from one area to the next within the same country. Try to find out the features of diarrhoea in the area in which you are working.

It is important to realise that the diarrhoea that is seen in a health centre or hospital is only a small fraction of the total. Staff and resources, however, are scarce and cannot be deployed to collect information on total morbidity and mortality through active surveillance in the community. So the data that are available must be examined carefully and the quality of routine statistics improved to make them meaningful. Health facility records do not keep track of all the diarrhoeal episodes and deaths in the area, but they can be used to make estimates. They can also help to define the seasonal patterns and the groups at greatest risk.

A routine **health information system** should be developed to collect data on a regular basis from the health facilities in your area. Most health workers are already collecting data of one sort or another - for example, number of reported illnesses and deaths due to measles and respiratory tract infections, and number of vaccinations administered. In such areas, information on diarrhoea may be provided through existing information systems for other diseases. In other areas, a diarrhoea information system may be the beginning of a broader integrated surveillance effort. You should also consider collecting data through **special studies**.

Routine surveillance systems can provide useful information to plan and evaluate diarrhoea control activities. Record useful data on simple, standardized forms. Transfer data from individual cards or reports to summary sheets. Make sure you compile the data regularly, for example on a monthly basis. Prepare graphs to help you monitor disease trends.

You might include the following information:

- total number of visits to the facility and number and proportion of visits for the treatment of diarrhoea, by age-group
- total number of deaths reported to the facility and number and proportion of deaths associated with diarrhoea, by age-group
- amount of oral rehydration salts and intravenous fluids that are used for the treatment of diarrhoea
- proportion of beds in the health facility that are occupied by diarrhoea cases

Month _____ Year _____		
Health Area _____		
Health Facility _____		
Age groups	All cases of diarrhoea (including those who died)	Deaths due to diarrhoea
1 year		
1-4 years		
5 years or older		

Sample monthly diarrhoea surveillance report



Using health information in Vietnam. (Isabelle de Zoysa).

Month _____ Year _____			
Health Area _____			
Health Facility _____			
<b>Number of uses of treatment services during the month</b>			
Reason for use	Age groups		Total
	0-4 yrs	5 yrs or older	
Diseases preventable by immunization			
- measles			
- whooping cough			
- other			
Diarhoea			
Malaria			
Respiratory diseases			
upper respiratory tract infections			
lower respiratory tract infections			
other			
Malnutrition			
Other			
Total			

Sample monthly usage form for treatment services

# THE WAY FORWARD

Disease trends may be considered in terms of:

- time (e.g. seasonal patterns)
- place (e.g. deprived communities)
- persons (e.g. age-groups at risk)



It is a mother's attitudes and beliefs about disease and its control that determine whether she breast-feeds her child, how she manages diarrhoea in the home and whether she brings her child to be vaccinated. (UNICEF)

Special studies are useful for collecting data that cannot be collected through routine information systems. For example, to estimate diarrhoea morbidity and mortality in a large area, a special study might be conducted to collect data in selected sample populations living in that area. The Control of Diarrhoeal Diseases Programme of the World Health Organization can give you specific technical guidance on how to conduct such special studies. A simple survey method for estimating diarrhoea morbidity and mortality is described in their *Manual for the Planning and Evaluation of National Diarrhoeal Diseases Control Programmes*<sup>22</sup>.



*Who has access?*  
Some particularly deprived communities such as slum dwellers or landless peasants may need special attention. (Jeremy Hartley)

## 3. Assess past diarrhoea control efforts

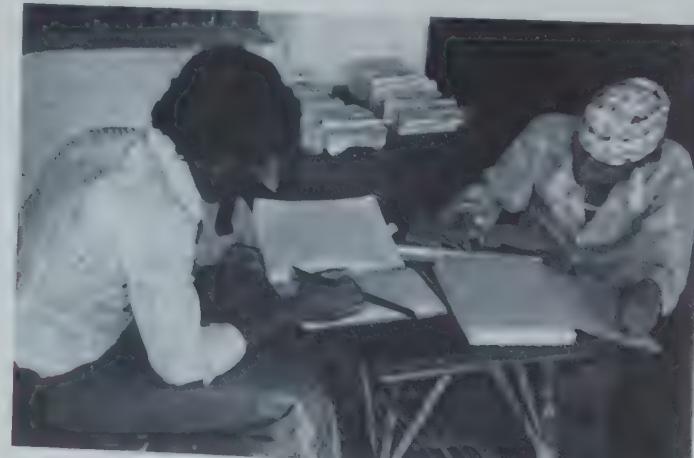
For example, try listing all the health care facilities in your area and state their function. Describe all health workers, including community-based health workers, and the services that they provide. When you have assessed the type and distribution of health care facilities and workers, try to determine how many people actually use them. Once the current level of use and the reasons for non-use are known, plans can be made to increase the utilization of services.

### Access

What proportion of persons living in an area have reasonable access to health services? For example, what proportion of persons in the area for which you are responsible live within 5 km of a health facility or in a village served by a community health worker?

### Usage

What proportion of persons who have access to health services actually use them when they need them? To collect this information, you will need to examine records to see where people who attend the health services are coming from. You may need to conduct a special study of a sample of families to find out about use and non-use of services (see *Manual for the Planning and Evaluation of National Diarrhoeal Diseases Control Programmes*)<sup>22</sup>.



Checking health

## 4. Prepare a plan of operation

Once you have collected information on diarrhoeal morbidity and mortality patterns, and past control efforts (including measures of access and usage), you have the basis for a plan of operation.

The first step is to decide how much emphasis should be given to each of the control strategies described in Section 3. Case management should receive most initial emphasis, because it can result in an immediate reduction in deaths due to diarrhoea.

You should then try to predict possible improvements due to increased control efforts. You can in this way set targets, for example, increases in access to services and usage of oral rehydration therapy. Other targets might include an increase in the proportion of children who are breast-fed according to recommendations, or an improvement in the coverage with measles immunization.

You should decide how the services will actually be delivered and what activities are needed to achieve your targets. Remember to consider whether you have the resources at hand to carry out this plan of operation. You may have to seek extra sources of funding.

## 5. A comprehensive programme approach

The success of a diarrhoea control programme requires a comprehensive programme approach on three fronts:

- improving the outreach and effectiveness of diarrhoea control activities throughout the health system.
- using all available channels to disseminate knowledge, impart skills and encourage the practice of diarrhoea control measures (for example, the widespread use of oral rehydration therapy)
- producing and distributing appropriate supplies and equipment needed for programme activities

### Use of the health system

Efforts must be directed at strengthening health delivery services. All types of health workers throughout the system should be involved in programme activities. The community health worker plays a key role because he or she can reach right into people's homes and enlist the participation of family and community members in diarrhoea control activities. Adequate support systems, however, must be developed and supervision and referral services must be organized at each level of the health system

### Use of communication channels

Most of the control interventions we have discussed in Section 3 depend on a change in behaviour at family and community level. There is an urgent need to find out more about local practices regarding diarrhoea in order to develop priority messages which address useful behavioural change. Educational and training materials must be designed to transmit these messages to those concerned at every level, namely: top decision-makers to ensure the appropriate allocation of resources, health workers and the community.

### Production and distribution of appropriate supplies

Adequate attention must be placed on logistics, that is, the procurement, maintenance and distribution of the equipment and supplies necessary to carry out programme activities. For example, a system must be developed to ensure that sufficient supplies of oral rehydration salts are available when and where they are needed. Stocks must be checked and future requirements assessed as orders may have to be placed many months in advance.



The seasonal features of diarrhoea in your area should be considered when timing both the procurement and distribution of oral rehydration salts. (TALC)

# THE WAY FORWARD

## 6. Monitoring and evaluation

Monitoring is the day-to-day follow-up of progress in implementing the diarrhoea control programme to ensure that operations are proceeding smoothly. Evaluation is the measurement of the performance of the programme. Actual achievements are compared to desired achievements to see if adequate progress has been made and to identify operational problems. Both monitoring and evaluation should involve more than simply stating that the uptake of a service is increasing or decreasing. They should also involve finding out why and taking appropriate action.

You should monitor *performance* of health workers to see if there are any problems that affect the quality of care being delivered to the people in your area. It will also allow you to see what work is being done well and should continue.

You should also monitor *usage* of health services in order to determine whether there are any problems affecting usage and to find ways to increase usage. For example, you can record the amount of oral rehydration salts that are distributed and used in order to investigate trends.

Evaluating *usage* of the health services means periodically (for example once a year), comparing actual usage of the services to desired usage in order to see if usage targets were achieved. This will allow you to see if adequate progress was made in increasing usage and you will be able to use the information when ordering supplies for the following year.



(Isabelle de Zoysa)

## TOPICS FOR DISCUSSION

### Morbidity, mortality and pressure on the health services

What are the most common illnesses you see in the health facilities in your area?

What are the main causes of death reported to the health authorities in your area?

Is diarrhoea among the most common causes of illnesses and deaths that are reported?

How are data on diarrhoea morbidity and mortality collected in your area? How reliable do you think these data are? How might you improve the quality and reliability of these data?

What age-groups are at greatest risk for diarrhoea in your area?

Which communities at greatest risk for diarrhoea might need more attention?

### Diarrhoea and malnutrition

How prevalent is childhood malnutrition in your area?

How might diarrhoea be contributing to the problem of malnutrition?

Are there any local beliefs and practices about feeding during and after diarrhoea that might be aggravating the problem?

## TOPICS FOR DISCUSSION

### Seasonality of diarrhoea

What are the seasonal patterns of diarrhoea in your area?  
How do you find out about them?

What is the relationship of seasonal diarrhoea with:

- climatic factors;
- seasonal changes in agricultural activities;
- other activities such as migrant labour?

### National diarrhoea control programmes

What are the national policies and programmes for the control of diarrhoea? What are the objectives of these programmes? What priority interventions are being promoted to reach these objectives? Are there any plans to develop diarrhoea control activities in your area?

### Case management

What are the local beliefs and practices regarding the administration of drinks and food to children with diarrhoea? Do they interfere with early oral rehydration therapy and appropriate feeding during diarrhoea?

What home-drinks could be promoted for children with diarrhoea? How might you encourage their widespread use?

What is the standard procedure for the treatment of dehydration in health facilities in your area? What oral rehydration solutions are available in these health facilities? Are these solutions acceptable to all health workers and mothers?

How good is the access to health services in your area? How might you improve access?

How might you improve usage of oral rehydration solutions in the prevention and treatment of dehydration?

### Interrupting transmission

What is the situation with regard to domestic water supplies in your area? Are there any water supply programmes in progress? If yes, do they focus on water quality or water availability or both? Why is this important?

Where do most people defaecate? What about the young children? Are there any sanitation programmes in progress?

Are these water supply and sanitation programmes supported by educational programmes which emphasize the importance of the excreta disposal and hygiene practices of young children? Why is this important?

Are health workers promoting important messages about personal and domestic hygiene? What are these messages?

### Breast-feeding

What are the local beliefs and practices about breast-feeding? Up to what age do most mothers breast-feed their children? At what age do they usually introduce supplementary foods? What kind of foods? Is bottle-feeding with infant formula widespread in your area?

How might breast-feeding patterns influence diarrhoea morbidity and mortality?

What programmes are operating in your area to promote breast-feeding? How might their effectiveness and coverage be improved?

### Measles immunization

Is measles a problem in your area?

Have you noticed an association between measles and diarrhoea?

Are children vaccinated against measles? Do you have an operational Expanded Programme on Immunization (EPI)? What are the target age-groups for measles vaccination? What is the coverage with measles immunization in your area? How might coverage be improved?

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**Glimpse.** Regular newsletter on diarrhoeal disease research published by the ICDDR,B (see resource centres).

**Mothers and Children.** Quarterly newsletter with project news, research developments, resource materials on all aspects of maternal and child health. Available from APHA (see resource centres).

**Salubritas.** Quarterly update on community health resource material. Available from APHA (see resource centres).

## Manuals on Training

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## WHO Publications

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*Treatment and prevention of acute diarrhoea: Guidelines for the Trainers of Health Workers* (1984)

*A Manual for the Treatment of Acute Diarrhoea. For use by Physicians and other senior Health Workers* (1984)  
WHO/CDD/SER/80.2.Rev.1

*Guidelines for the Production of Oral Rehydration Salts* (1980) WHO/CDD/SER/80.3

*Manual for the Planning and Evaluation of National Diarrhoeal Diseases Control Programmes* (1981)  
WHO/CDD/SER/81.5

*WHO/UNICEF The Management of Diarrhoea and use of Oral Rehydration Therapy* (1983)

McQuestion, M.J., WHO/PAHO. *Oral Rehydration Therapy: An Annotated Bibliography* (1983) Scientific Publication No. 445

## RESOURCE CENTRES

Appropriate Health Resources and Technologies Action Group (AHRTAG)  
85 Marylebone High Street  
London W1M 3DE  
U.K.

American Public Health Association (APHA)  
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1015 15th Street NW  
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Health Manpower Development Staff  
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Department of Tropical Hygiene  
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United Nations' Children's Fund (UNICEF)  
866 United Nations Plaza  
New York  
NY 10017  
U.S.A.

Voluntary Health Association of India (VHAI)  
C-14 Community Centre, SDA  
Opp IIT Main Gate  
New Delhi 110 016  
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World Health Organization (WHO)  
1121 Geneva 27  
Switzerland

## Other sources of information for the development of health education materials

British Council Media Group  
10 Spring Gardens  
London SW1A 2BN  
U.K.

British Life Assurance Trust Centre  
for Health and Medical Education (BLAT)  
BMA House  
Tavistock Square  
London WC1H 9JP  
U.K.

Bureau d'Etudes et de Recherches  
pour la Promotion de la Santé  
B.P. 1977  
Kangu-Mayombe  
Zaire

PIACT de Mexico  
Shakespeare No. 27  
Mexico 5, DF  
Mexico

Teaching Aids at Low Cost (TALC)  
Tropical Child Health Unit  
Institute of Child Health  
30 Guildford Street  
London WC1N 1EH  
U.K.



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